XC

RMO

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

Project	Date	Author

TITLE

SPECIES RELATIONS IN LITHOCID BOMBYCOSA AND CERTAIN BIRDS
LASSEN NATIONAL FOREST, CALIFORNIA

Seasons of 1937, 1938, 1939

C. W. Lensberg
Berkeley, California
March 29, 1940

Annex 1
SB
763
.C2 L3
1939 A

SUBJECT—

INDEX NO.—

U. S. GOVERNMENT PRINTING OFFICE 8—9742

Forest Insect Laboratory
Berkeley, California
March 29, 1940

SPECIES RELATIONS IN INFESTED PONDEROSA AND JEFFREY PINES LASSEN NATIONAL FOREST, CALIFORNIA

Season of 1937, 1938, 1939

National FS Library
USDA Forest Service

MAR 2 1 2014

240 W Prospect Rd
Fort Collins CO 80526

APPROVED BY:

J. M. MILLER
Senior Entomologist, In Charge

SUBMITTED BY:

J. W. BONGBERG
Junior Entomologist

TABLE OF CONTENTS

INTRODUCTION 1

METHODS 1

INFESTATION CONDITIONS 2

Fringe Areas:
1937. 2
1938. 2
1939. 3

Interior Areas:
1937. 3
1938. 3
1939. 3

SPECIES RELATIONS. 3

Fringe Areas:
Ponderosa Pine. 3
Jeffrey Pine. 4

Interior Areas:
Ponderosa Pine. 4
Jeffrey Pine. 5

SUMMARY AND CONCLUSIONS. 5

FIGURES:

SPECIES RELATIONS IN INFESTED PONDEROSA AND JEFFREY PINES
LASSEN NATIONAL FOREST, CALIFORNIA

Seasons of 1937, 1938, 1939

INTRODUCTION

When measuring dead timber during regional survey practice, the insect species found in the portion of the bole readily sampled from the ground are recorded as being responsible for the death of the tree. For the most part, this basal examination generally reveals but a single species causing death, whereas in the remainder of the bole that cannot be reached from the ground there may be a number of other insects involved.

In dealing with the pine beetle problem in east side stands of northeastern California it is important that a determination be made of all insect species primarily responsible for the death of the tree rather than rely entirely on basal examinations. A complete bole analysis of a series of infested trees is of considerable value in supplementing general observations and impressions of barkbeetle activity as judged from survey and reconnaissance work, and in a good many cases, this information can be used to good advantage in forecasting and interpreting seasonal infestation trends.

For the past three seasons the species relations in infested ponderosa and Jeffrey pines on the Eastern Lassen area have been sampled by felling a series of summer and winter brood trees each year. This report has been prepared to show the species occurrence in infested trees and point out, as far as possible, significant variations and changes in species relations that have occurred during this three year period.

METHODS

Before starting the study in this area in 1937 it was decided to sample fringe conditions along with areas representing better site qualities. Where possible, both ponderosa and Jeffrey pine were to be included in the sample.

For the advantage offered in transporting felling equipment by car, and because larger areas could be represented in the sample, road strips were used in locating infested trees. Between 25 and 50 trees within five chains of either side of the road were included in each year's sample on both fringe and interior areas.

At the conclusion of the field work, the square feet of bark surface was computed for each infestation type throughout the entire length of the bole. Summations were then made of total bark area infested by the various insects and yearly comparisons made between infestation types.

When summarizing bark areas for making comparisons of species occurrence, the species relations were noted to differ somewhat between trees that had been top-killed previous to complete infestation and trees which had been completely attacked during a single season. Since this difference of insect composition occurred, it was considered advisable to segregate the infested trees into types and make comparisons of species fluctuations on that basis. Two tree types were established:

1. Trees with top injury previous to complete infestation and death (Figure 1).

2. Trees without top injury previous to complete infestation (Figure 2).

In some years, the sudden increase and decrease of top-killing engraver beetles leave many trees throughout a stand with only the upper crown killed. In other years upper crown infestations are the result of progressive activity by the California flathead borer, Melanophila californica Van Dyke. If increased activity by these two species of insects which concentrate their attacks in the upper portion of the bole occur at a time when pine beetle populations are low, many trees throughout the stand are top-killed and not completely infested.

Since species relations seemed to be closely associated with the type of trees infested, it is necessary to consider the infestation conditions in an area before interpreting fluctuations in species relations.

INFESTATION CONDITIONS

Fringe Areas

1937. During 1937 pine losses in fringe areas consisted of a scattering of infested trees, all of which occurred singly. Losses in ponderosa pine were infrequent. The majority of the loss was in Jeffrey pine.

1938. The infestation during 1938 closely paralleled conditions during 1937. For the most part, losses in ponderosa pine continued to occur as scattered single trees. Occasionally there was a small group kill. Losses in Jeffrey pine were quite similar to the 1937 type, all loss occurring in single trees.

1939. An increase in pine loss was noted for the entire Lassen Area during 1939. Ponderosa pine accounted for a large majority of the increase. Losses in Jeffrey pine were considerably below the 1938 level. Group kills of from two to ten ponderosa pines were frequent.

Interior Areas

1937. During 1937 the infestation was found to be very similar to fringe conditions. The loss was endemic and infested trees occurred well scattered.

1938. Losses during 1938 showed very little variation from conditions which prevailed during 1937. Approximately 30 percent of the kill occurred in two and three tree groups. This group loss presents the first indication of aggressiveness on the part of the western pine beetle and indicates an upswing in loss trends.

1939. Losses in both pine species showed considerable increase during 1939. Group kills in ponderosa pine were frequent. In contrast to fringe areas, the seasonal loss in Jeffrey pine remained at a normal level.

SPECIES RELATIONS

Fringe Areas

The three seasons work sampling species relations in fringe areas on the Eastern Lassen has been concentrated above Murken Bench in T 34 N, R 5 and 6 E, M. D. M. Approximately 15 miles of road strip were covered each year.

Ponderosa Pine: There are seven species of insects which commonly attack green ponderosa pines. The western pine beetle, Dendroctonus brevicomis Lec., the mountain pine beetle, Dendroctonus monticolae Hopk., and the California flathead borer, Melanophila californica Van Dyke are, for the most part, the major insects involved in the infestation. The engraver beetles, Ips emarginatus Lec., and Ips oregoni Lec. often accompany attacks of the insects listed above, and in some years the latter species is often abundant, causing considerable top-killing.

5-Listed-

The comparison of species relations of the above mentioned insects and the fluctuation in infestation conditions by tree types for the fringe area during the past three years is shown in Figure 3. Each tree figure represents 10 percent of the total number of trees in the sample.

It will be noted that in fringe areas there has been very little variation in the types of trees infested. Because of adverse factors that prevail under those conditions it would not be expected that more than slight variations in infestation types would occur. This is particularly true during the period of endemic loss during 1937 and 1938.

In all of the trees infested, the western pine beetle was involved in a majority of the total bark area. However, during 1939, in trees that had previously been top-killed, pure broods of the western pine beetle were considerably less than in the two years previous. This decrease of pure pine beetle broods seems to be associated with an increase in flathead borer broods. It will be noticed also that in trees without previous top injury, engraver beetles have shown a considerable increase during 1938 and 1939. The variations in occurrence of other species are not considered significant.

Jeffrey Pine: In general, two species of insects are involved in lethal attacks on Jeffrey pine. The Jeffrey pine beetle, Dendroctonus jeffreyi Hopk., and the California flathead borer Melanophila californica Van Dyke occur most often in the cambium region of infested trees. Engraver beetles, as in ponderosa pine, are often present.

Only a small series of Jeffrey pine have been sampled during the course of the study to date. For this reason there will be no attempt to graphically present the fluctuations in species relations. From the analysis records on hand the following may be said of the species infesting Jeffrey pine:

1. During 1937 and 1938 the infestation was predominately a bark-beetle and flathead borer combination. Both species were commonly present in the infested trees, either as pure broods or intermixed with each other.

2. During 1939 flathead borers occurred more often in the infested bole. Attacks of the Jeffrey pine beetle were patchy. During the fall months, pine beetle broods ranged in development from egg to new adults in the same bole. This indicated periodic attacks on the same tree and a general decrease in activity during the course of the season.

Interior Areas

The sampling of species relations in infested trees on interior areas has been concentrated on approximately 10 miles of road strip to the east of the Black's Mountain Experimental Forest in T 33 N, R 8 E, M.D.M. A few trees within the Experimental area are included in the sample.

Ponderosa Pine: A comparison of species relations in infested tree types for interior areas in the Eastern Lassen during the past three seasons is shown in Figure 4. First to be noted is the increase of the infestation during 1939 in trees without previous top-killing before death. To be noted in species relations during these three years are:

1. The close similarity in species composition in trees where top-killing preceded death.

2. The abundance of uninfested top portions of the bole in trees completely infested during a single season. This condition seems to be characteristic during periods of endemic loss. (Infestation conditions during 1937 and 1938 were endemic).

3. The abundance of top-killing engraver beetles during 1938 and 1939.

4. The smaller proportion of flathead borer broods during 1937 and 1939.

Jeffrey Pine: A sample of species relations in Jeffrey pine on interior areas was secured only during 1939. For the most part the composition of the infestation was very similar to that of fringe areas during 1937 and 1938, composed of mixed broods of Jeffrey pine beetle and flathead borers.

SUMMARY AND CONCLUSIONS

The species relations in infested ponderosa and Jeffrey pines on the Eastern Lassen Area have been sampled during the past three seasons by making a complete bole analysis of a series of infested trees each year.

In summarizing species occurrence throughout the length of the infested bole it was noticed that species relations differed between trees that had been completely attacked during a single season and trees that died as a result of prolonged infestations. On that basis, two types of infested trees were established in making comparisons of species fluctuations:

1. Trees with top injury previous to complete infestations.
2. Trees without top injury previous to complete infestations.

Because of variations in species occurrence in tree types, interpretations could not be made of species relations without consideration being given to infestation trends during the period represented in the record. The following tentative conclusions can be drawn from the study to date:

1. Under fringe conditions, very little variation has occurred either in type of tree infested or in species relations in infested trees. The western pine beetle was involved in a majority of the infested bark area. Flathead borers were abundant in portions of many trees either as pure broods or intermixed with the pine beetles.

2. On interior areas, considerable variation occurred both in types of trees infested and in species relations in infested trees. Western pine beetle broods were represented in a majority of the bark area. Top-killing Ips were quite prevalent in the 1939 infestation.

For an accurate determination of insects primarily responsible for the death of trees and a determination of fluctuations in species occurrence throughout the infested bole it will be necessary to fell a series of infested trees each year.

Figure 1

Infested tree with top injury previous to complete infestation.

Figure 2

Infested tree without top injury prior to complete infestation.

Figure 3

Species Relations - Ponderosa Pine - Fringe Areas

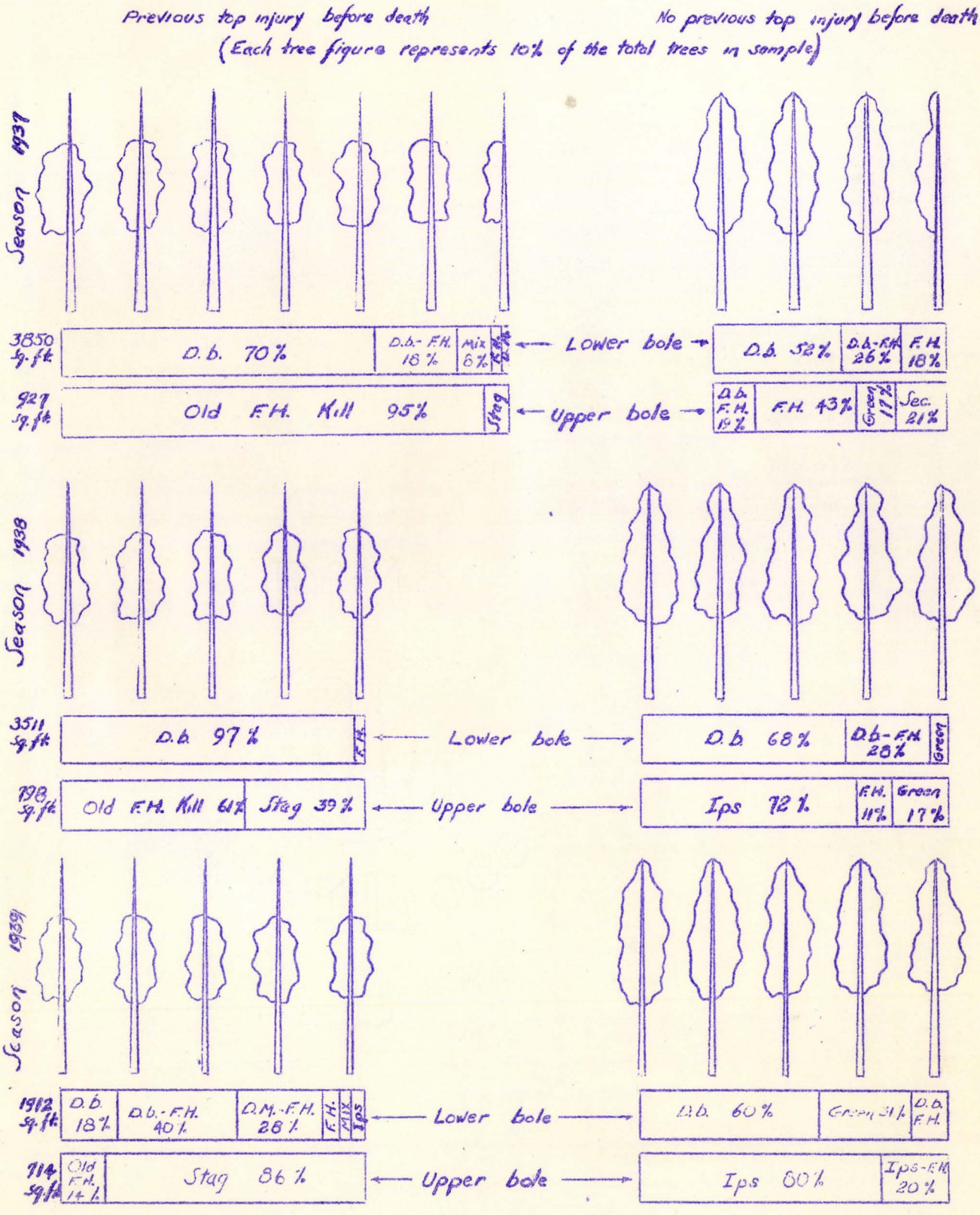

Figure 4

Species Relations - Ponderosa Pine - Interior Areas